

# ENTOMOLOGICAL NEWS

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VOL. LXII

MAY, 1951

No. 5

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## Sympetrum semicinatum (Say) and its Nearest Allies (Odonata)

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The marked difference in size and color pattern between specimens of *Sympetrum semicinatum* (Say) from eastern and western North America is well known but has received little attention from American students of Odonata. Two European workers, however, Ris and Bartenev, have dealt with this matter at some length. Ris (1911) termed *S. semicinatum* a species of "considerable polymorphism" and suggested that the various forms that he recognized and described probably deserved distinctive names, although he left the naming of them to others. Under the name of *S. semicinatum* Ris recognized two main series or forms, an eastern and a western, the latter form with three subdivisions, distinguished by differences of color pattern and inhabiting distinct geographical ranges. Bartenev (1915) described Ris' western forms collectively as a new subspecies, which he named *S. semicinatum occidentale*. His description, which is in Russian,\* appears to be essentially a translation of Ris' work and includes his descriptive notes on the three subdivisions of this western form. No reference is made to a type

\* For a translation of this description my sincere thanks are due to Mr. M. G. Gideonoff of the Royal Ontario Museum.

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### PLATE I

*Sympetrum semicinatum* (Say) and *S. occidentale* Bartenev, slightly reduced. Males on the left, females on the right.

Top row: *S. semicinatum*, male, Lake Simcoe, Ontario; female, Kettleby, Ontario. Second row: *S. occidentale occidentale*, male, Chilliwack, B. C.; female, Cultus Lake, B. C. Third row: *S. occidentale californicum*, male, "California"; female, Auburn, Calif. Bottom row: *S. occidentale fasciatum*, male and female, Suffield, Alberta.

specimen, nor could we find any evidence that Bartenev possessed a specimen of his subspecies *occidentalis* although he refers to specimens in his collection of the eastern *S. semicinctum*. We prefer, however, to give Bartenev the benefit of the doubt, and we are therefore retaining his name, with the emended spelling *occidentale*, and are provisionally accrediting this name to his authority. We believe, however, that *S. occidentale* deserves the rank of a species rather than a subspecies.

Having decided to investigate the taxonomy of the *semicinctum* species complex, the writer applied to Dr. J. Speed Rogers, Director of the Museum of Zoology, University of Michigan, Ann Arbor, for permission to study the material in the Williamson collection. In response to this request all of the material in this collection labelled *Sympetrum semicinctum* was immediately shipped to the Royal Ontario Museum of Zoology, and for this prompt and generous co-operation we desire to express our thanks and appreciation.

The Williamson collection contains ample material for the recognition and characterization of the various definable forms in this species complex and their general geographical ranges in the United States. It has been supplemented by the material in the Canadian National Collection at Ottawa and the Royal Ontario Museum at Toronto, which afford additional data on the distribution of the species in Canada.

Ris (1911) made no subdivision of the eastern form of *S. semicinctum* but, as already mentioned, he divided the western form into three groups, differing mainly in the wing pattern and having distinct distributional ranges, viz., (a) Colorado and New Mexico, (b) Nevada and California, and (c) Washington and British Columbia.

The results of our study confirm the findings of Ris both as to the taxonomic divisions of the group and their geographical distribution. We would add the following before discussing the subject in detail:

The eastern form is remarkably uniform throughout its range and shows no tendency to intergrade with any of the western forms. Its distributional range is also distinct and, as far as

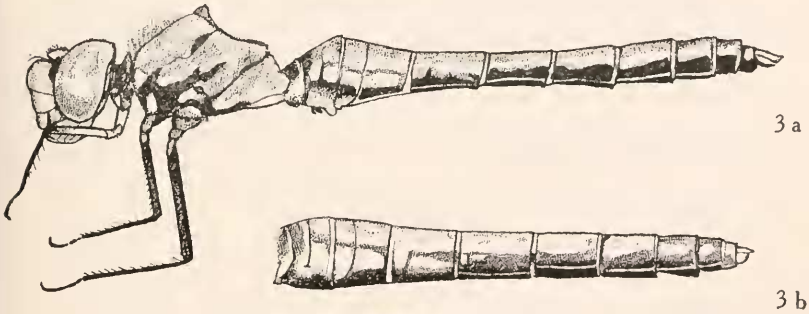
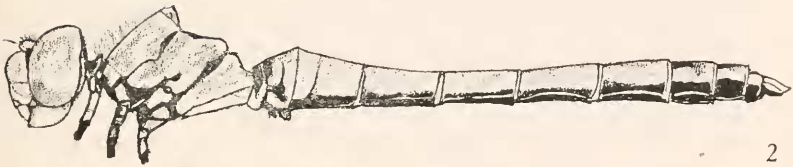
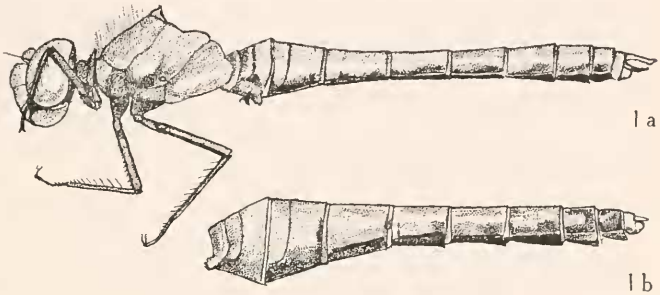


- of the spiracle; trochanters and posterior surface of fore femora pale yellow; range U. S. and southern Canada from Pacific coast to Great Plains. . . . . *occidentale* 2
2. Yellow area of wings rarely darkened distally on both pairs of wings and, if so, not forming a transverse band crossing the two wings of each side; range west of the Rocky Mountains. . . . . 3
- Yellow area of wings proximally pale or relatively pale, distally darkened, forming a transverse band of nearly uniform width across both pairs and ending fairly sharply in a nearly straight or curved line; range, arid or semi-arid plains, chiefly east of the Rocky Mountains, but reaching eastern Utah and N.E. Arizona. . . . . *o. fasciatum*
3. Yellow area of hind wings of ♂ extending 1-3 cells beyond nodus, color deepening distally in old ♂♂, in fore wings usually ending abruptly at nodus or only one cell before or beyond; in ♀ reaching nodus in both wings, or 2-3 cells proximal to it in fore wings; color nearly uniform yellow; sides of thorax in old individuals dark yellowish brown, tending to obscure the black markings; range southern British Columbia to Oregon, Idaho and northern Utah. . . . . *o. occidentale*
- Yellow area of hind wings of ♂ reaching nodus, not darkening distally; in front wings of ♂ and both pairs of ♀ very pale and diffuse; general body coloration of both ♂ and ♀ paler than the above, the sides of the thorax and basal segments of abdomen turning grayish or greenish with maturity; range California and western Nevada, grading into *occidentale* in eastern Nevada. . . . . *o. californicum*

### **Sympetrum semicinctum** (Say)

The general color is darker and more obscurely marked than in *occidentale*. In mature individuals the only pale yellowish areas are the small marginal spots on the rear of the head and two ill defined spots on the sides of the pterothorax, which often disappear in old males. These yellow spots are margined below with blackish, but there are no clearly defined black markings in the pleural sutures nor above the bases of the coxae, such as are always present in *occidentale*. The abdomen is reddish brown on the basal three segments, becoming distally red in the male, and the black latero-marginal spots on segments 3-6 are more or less discontinuous or absent from the more anterior

segments. The basal area of the wings is as follows: ♂, fore wings pale yellow about as far as the second cell beyond the triangle, fading out diffusely; hind wings colored as far as the nodus or about one cell beyond, the proximal half deep yellow to brown, the distal half darker brown, this shade extending in a broad arc to the anal triangle; ♀, basal yellow area of fore wings deeper and more extensive than in ♂, reaching to within



EXPLANATION OF TEXT-FIGURES

Fig. 1a. *Sympetrum semicinctum* (Say), ♂. 1b. Abdomen, ♀.

Fig. 2. *S. occidentale fasciatum* n. subsp., ♂.

Fig. 3a. *S. occidentale occidentale* n. subsp., ♂. 3b. Abdomen, ♀.

2 or 3 cells of the nodus and more sharply delimited; that of hind wings about as broad as in ♂ but of a more uniform yellow.

*Material identified* (88 ♂♂, 54 ♀♀): *Nova Scotia*: Annapolis and Halifax counties, VII 31 to IX 30; *New Brunswick*: Gagetown, VIII 9. *Quebec*: Covey Hill, Knowlton, Kazabazua and Wakefield, VII 25 to IX 4. *Ontario*: Middlesex, Welland, Peel, York, Ontario, Bruce, Simcoe, Leeds, Lanark, Renfrew and Carlton counties, Muskoka, Parry Sound and Nipissing districts. Also observed in Rainy River District, VI 19 to IX 24. *Maine*: Orono, Bradley, VII 1 to IX 30. *New Hampshire*: Intervale, IX 16-20. *New York*: Ithaca, VII 24. *Pennsylvania*: Allco.\* *Michigan*: St. Joseph, Livingston and Oakland counties, VII 4-12. *Indiana*: LaGrange, Whitley, Huntington and Wells counties, VI 25 to IX 5. *Virginia*: Wythe Co., VI 27. *North Carolina*: Buncombe Co., VIII 23. *Tennessee*: Gatlingsburg, Sevier Co., VII 18.

Records of *S. semicinctum* from Minnesota and Iowa probably belong to this species. There is a male in the Williamson collection labelled "Klamath Co., Oregon, Aug. 10, 1934 (Hubbs)." There is also in this collection a small dark male of *S. o. occidentale* Bart. labelled "Logan Co., Ohio, July 4, 1934, E. B. W. et al." The two specimens look superficially somewhat alike and have doubtless been transposed. Other specimens taken at these same localities on the same dates and by the same collectors support this belief.

We have observed no geographical variation in this species in either size or color pattern. Specimens from Tennessee, Michigan and Nova Scotia, e.g., are entirely similar in every respect. Individual variation in size is about as usual in *Sympetrum*. Measurements of 10 ♂♂ and 10 ♀♀ were as follows: Length ♂ 24.5 to 31.0, ♀ 24.0 to 29.0; abd. (excl. apps.) ♂ 15.0 to 19.5, ♀ 15.0 to 19.0; hind wing ♂ 18.5 to 22.5, ♀ 18.0 to 22.0.

Although generally distributed, *S. semicinctum* appears to be everywhere a rather scarce species, never occurring in large numbers as most of the species of its genus do. This is probably due, in part at least, to its type of breeding place, which is chiefly marshy spots on the course of small, spring-fed streams.

\* "Allco" probably stands for Allegheny County.—ED.

**Sympetrum occidentale** Bartenev

Although the average size of this species is definitely greater than that of *S. semicinctum*, the smallest individuals are scarcely larger than the average of the eastern species. In young individuals the clear yellow color of the face, sides of the thorax and basal segments of the abdomen, and the definite black thoracic markings, give this species an aspect that is very distinct from that of *semicinctum*. In old specimens the yellow parts may become darkened to a dull ochraceous, greenish or grayish, and the black markings are then less conspicuous, though always discernible. The black latero-marginal spots on segments 3-6 of the abdomen form a more definite and continuous stripe than in *semicinctum*. In the female this stripe is divided anteriorly (seg. 3 and 4) into two, a mid-lateral and a ventro-lateral. This feature is sometimes seen, though less distinctly, in the males. It is not, however, a characteristic of *S. occidentale*, being not infrequently present in females of *S. semicinctum*.

We have found no constant structural differences between the two species. In the males the outer branch of the hamuli tends to be longer and more slender in *occidentale* but this character is by no means constant. A careful comparison of the anal appendages of the male also revealed no reliable differences. The penis likewise appears to be lacking in diagnostic features but we have not sufficient material for an adequate study of this organ.

As Bartenev designated no type of his subspecies *occidentalis*, which we have elevated to the rank of a species, it is necessary to select a type from one of its three subspecies as we now recognize them. We have chosen as the typical subspecies that which is most nearly intermediate between the other two, geographically and perhaps also taxonomically. The type specimens are recorded under this subspecies, *S. occidentale occidentale*.

*S. occidentale* is an abundant species, apparently with a much wider variety of breeding places than its eastern relative. Whitehouse (1941) states: "While the Harrison Bay district (its smaller lakes and streams) yielded a fine variety of dragonflies,



the great body of water itself seemed in mid-August to be favored only by *semicinctum*, which positively swarmed in mated pairs busy ovipositing." This is a type of habitat entirely foreign to *S. semicinctum*.

***S. occidentale* Bartenev *occidentale* subsp. n.**

This subspecies, when old and darkened, is most like *semicinctum* in appearance. This is seen in the wing pattern as well as the dark body coloration and relative obscurity of the black thoracic markings. These can always be seen, however, and judging from the material at hand the size is constantly larger. Although usually not larger than the other subspecies of *S. occidentale*, it reaches the maximum size for the species in specimens from Chilliwack and Harrison Bay, B. C. Males vary in length from 32.5 to 40.0 mm., ♀♀ 31.0–35.0; abd. (exc. apps.) ♂ 20.0–23.5, ♀ 20.0–24.0; hind wing ♂ 25–28; ♀ 24–26.

*Holotype* ♂ and *allotype* ♀: New Bridge, Baker Co., OREGON, Sept. 9, 1909 (pair), C. H. Kennedy; in the Williamson collection, Museum of Zoology, Ann Arbor, Mich.

*Material identified* (34 ♂♂, 53 ♀♀): *British Columbia*: Langford Lake and Departure Bay, Vancouver Island; Abbotsford, Cultus Lake, Chilliwack and Harrison Bay, New Westminster District; Oliver and Osoyoos, Similkameen District; Okanagan Landing, Osoyoos District; Aspen Grove and Mt. Ida, near Salmon Arm, Kamloops District; VII 17 to IX 24. *Washington*: Sunnyside, Yakima Co., VII 24 to VIII 24. *Oregon*: Klamath Co., VIII 10–13; New Bridge and Baker City, Baker Co., IX 9–14. *Idaho*: Pocatello, Bannock Co.; Medimont, Kootenai Co.; Toponz, Lincoln Co.; VI 28 to X 6. *Utah*: Provo; City Creek Canyon; and State Canyon, Provo, 5000', and Vineyard, Utah Co.; Ogden and Farr West, Weber Co.; Hurricane, Washington Co.; VII 14 to IX 14.

Specimens from Farr West and Provo, Utah, show in most cases some reduction or diffusion of the yellow color of the wing bases in the females, as compared with the material from Washington and western British Columbia. Paler coloration of the thorax with a tendency to become grayish with age is also seen in the Utah specimens and in some degree in specimens from



Bannock, Idaho, and the interior of British Columbia, e.g., the Kamloops District. These features are perhaps correlated with a drier climate. They are present in a more marked degree in the following subspecies.

***S. occidentale californicum* subsp. n.**

Ris (l.c.) has given an excellent description of this form, which we translate, with slight modifications, as follows: "The yellow basal areas of the wings are reduced and pale, in the fore wing of the ♂ very pale and extending to about the second cell beyond the triangle, with somewhat stronger yellow streaks in the subcostal and cubital spaces, or reduced to these streaks alone; in hind wing as far as the nodus, golden yellow, somewhat deeper in Sc and Cu, the distal darkening wholly lacking, or reduced to a few brown lines along the veins; ♀ in fore wing as in ♂, in hind wing not reaching the nodus, about 2 cells distad of triangle or, at the minimum, not beyond the triangle, very diffuse to the anal margin, or only to the middle of the loop, or scarcely beyond the membranule." The general coloration of the body is somewhat paler than either of the other subspecies and the thorax and basal segments of the abdomen become grayish or greenish with age, having a slightly pruinose appearance.

*Holotype* ♂ and *allotype* ♀: American River, Sacramento, CALIFORNIA, July 15, 1914 (pair), C. H. Kennedy; in the Williamson collection, Museum of Zoology, Ann Arbor, Mich.

*Material identified* (18 ♂♂, 21 ♀♀): *California*: Surprise Valley, Modoc Co.; Auburn, Placer Co.; American River, Sacramento Co.; Laws, Inyo Co.; and a long series from "California" without further data; VII 15 to VIII 28. *Nevada* (including intergrades with subsp. *occidentale*): Humboldt Co.; Pershing Co.; Eureka Co.; Pyramid Lake, Washoe Co.; Nye Co.; Cherry Creek, White Pine Co.; VII 6 to VIII 28.

This seems to be the most variable in size of the three subspecies of *S. occidentale*, and is on the whole the smallest. The series from "California" contains a number of individuals, chiefly females, that are about the same size as average *S. semicinctum*.

Measurements of 10 ♂♂ and 1 ♀♀ from various localities are as follows: Length ♂ 31–37 mm., ♀ 28.0–33.5; abd. (excl. apps.) ♂ 18.5–23.5, ♀ 19.5–22.5; hind wing ♂ 22.5–28.0, ♀ 22–26.

Intergradation with *S. o. occidentale* is found in White Pine, Eureka and Nye counties, Nevada. In the series from White Pine Co., 9 ♂♂ and 15 ♀♀, the females could all be placed almost equally well with *occidentale*. The pale thoracic pleura, which turn grayish in old individuals, are like those of *californicum*, while the yellow area of the hind wings (♀♀) is smaller than in typical *occidentale* but not so diffuse as in typical *californicum*. The males could be placed almost equally well in either subspecies but the yellow (or brown) area of the wings is never distinctly deepened distally as it is in fully mature *occidentale*. Intergradation of the two subspecies in the coastal zone, i.e., between Oregon and California, has not been observed in the limited material from that region.

#### **Sympetrum occidentale fasciatum** subsp. n.

This subspecies in its typical form is easily recognized by its wing pattern. The colored area reaches the nodus in the front wings and one or two cells beyond it in the hind wings, and in both pairs the proximal part of this area is pale, or, in old individuals, relatively pale, while the distal part is dark yellow or brown, forming a band of nearly uniform width, crossing both wings from front to hind margin and terminating abruptly in an almost straight line. The pale yellow parts of the thorax and abdomen turn greenish gray in old individuals. The black markings of the thorax tend to be less heavy than in the other subspecies. While *fasciatum* is, on the whole, somewhat less stocky in build than the other forms, with the abdomen relatively a little longer (text-fig. 2), this difference is not constant enough to be useful as a taxonomic character.

The range in size is similar to that of *S. o. californicum*. Measurements of 10 ♂♂ and 10 ♀♀ are as follows: length ♂ 30–37 mm., ♀ 30–34.5; abd. ♂ 18–23, ♀ 20–23; hind wing ♂♀ 23–27.

*Holotype* ♂ and *allotype* ♀: Grand Co., УТАН, 2 mls., n. of

Moab, June 16, 1937, Leonora K. Gloyd. In the Williamson collection, Museum of Zoology, Ann Arbor, Mich.

*Material identified* (38 ♂♂, 27 ♀♀): *Alberta*: Suffield; VIII 2. *South Dakota*: Washabaugh Co., 7 mls. s. of Kadoka; VIII 12. *Nebraska*: Halsey and Nebr. National Forest, Thomas Co.; VIII 23. *Kansas*: State Park, Scott Co.; VII 20. *Wyoming*: Fremont Co., 40 mls. e. of Dubois; VII 23. *Colorado*: Clear Creek Co.; Montclair and Berkeley, Arapahoe Co.; Denver; Golden and Morrison, Morrison Co.; Lamar, Prowers Co.; Walsenburg, Huerfano Co.; San Luis Valley, Monte Vista, Rio Grande Co.; Mesa Co., 1.1 ml. n. of Grand Junction; VII 13 to X 10. *Utah*: Fort Duchesne, Uintah Co.; Grand Co., 2 mls. n. of Moab; VI 15 to IX 8. *New Mexico*: Raton, Colfax Co.; Albuquerque, Bernallillo Co.; Las Vegas, San Miguel Co.; VII 15 to X 21. *Arizona*: Apache Co., 22 mls. w. of Eager; VIII 24.

This subspecies thus inhabits the arid and semi-arid plains east of the Rocky Mountains, from southern Alberta to New Mexico, also reaching eastern Utah and northeastern Arizona. Records of *S. semicinctum* from Oklahoma and Texas probably belong to this form.

The only specimens we have seen that give indications of intergrading with other subspecies are those from Rio Grande Co., in southwestern Colorado, viz. 2 ♂♂ and 4 ♀♀ from the San Luis Valley, Monte Vista. These are like *fasciatum* in the clearly defined yellow areas of the wings and in the relatively large size of this area on the front wings, but they differ from typical *fasciatum* in having only slight traces of the dark distal wing bands.

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